

Claims

- [c1] **What is claimed is:**
1. A method comprising the steps of:
applying a non-selective preparation pulse for a first slice;
applying a notched preparation pulse for subsequent slices; and
acquiring MR data.
 - [c2] 2. The method of claim 1 wherein the non-selective preparation pulse is effective for blood pool suppression for the first slice and a next slice.
 - [c3] 3. The method of claim 1 wherein the step of acquiring includes the step of applying a series of readout pulses for each slice.
 - [c4] 4. The method of claim 3 wherein each series of readout pulses defines an image acquisition segment and wherein the image acquisition segment for the first slice has less spatial resolution than that of the other acquisition segments.
 - [c5] 5. The method of claim 3 wherein the first slice acquired has a different orientation than that of subsequent slices

acquired.

- [c6] 6. The method of claim 5 wherein the subsequent slices acquired are oriented in parallel to one another.
- [c7] 7. The method of claim 1 wherein the number of slices extend over a series of R-R intervals.
- [c8] 8. The method of claim 1 further comprising the step of providing a linear measurement of contrast concentration over a region-of-interest.
- [c9] 9. The method of claim 1 further comprising the step of reconstructing an image of renal or liver perfusion in a subject.
- [c10] 10. A pulse sequence comprising:
 - a non-selective preparation segment followed by a first acquisition segment played out in a calibration interval; and
 - a series of notched selective preparation segments followed by subsequent data acquisition segments played out after the calibration interval.
- [c11] 11. The pulse sequence of claim 10 wherein the first acquisition segment has a spatial resolution different from that of the subsequent acquisition segments.
- [c12] 12. The pulse sequence of claim 11 wherein the spatial

resolution of the first acquisition segment is less than that of the subsequent acquisition segments.

- [c13] 13. The pulse sequence of claim 12 wherein the spatial resolution of the image acquisition segment is one-half than that of the image acquisition segments.
- [c14] 14. The pulse sequence of claim 10 further comprising a data acquisition segment in a given R-R interval that is not preceded by a non-selective preparation segment for that data acquisition segment.
- [c15] 15. The pulse sequence of claim 10 wherein the non-selective preparation segment includes a saturation recovery pulse that is effective for a first slice and a next slice.
- [c16] 16. The pulse sequence of claim 10 wherein the first acquisition segment is configured to acquire data that extends along a plane different from data acquired in the subsequent data acquisition segments.
- [c17] 17. An MRI apparatus comprising:
 - a magnetic resonance imaging (MRI) system having a plurality of gradient coils positioned about a bore of a magnet to impress a polarizing magnetic field and an RF transceiver system and an RF switch controlled by a pulse module to transmit RF signals to an RF coil assem-

bly to acquire MR images; and
a computer programmed to:
apply a non-selective, saturation recovery pulse de-
signed to saturate a first slice of a set of slices;
apply a series of notched saturation recovery pulses to
saturate each succeeding slice of the set of slices;
apply a series of readout excitation pulses; and
acquire MR data from each slice of the set of slices.

- [c18] 18. The MRI apparatus of claim 17 wherein the computer is further programmed to acquire multiple slices of data in a single R-R interval.
- [c19] 19. The MRI apparatus of claim 17 wherein the series of readout excitation pulses represents an image acquisition segment played out for data acquisition from each slice and wherein the image acquisition segment of the first slice has a spatial resolution less than each other image acquisition segment.
- [c20] 20. The MRI apparatus of claim 19 wherein the spatial resolution of the first image acquisition segment is one-half of that of each other image acquisition segment.
- [c21] 21. The MRI apparatus of claim 20 wherein the non-selective, saturation recovery pulse is effective over the first slice and a next slice.

- [c22] 22. The MRI apparatus of claim 20 wherein the series of notched saturation recovery pulses are selective saturation pulses to suppress a blood pool.
- [c23] 23. A computer readable storage medium having a computer program stored thereon and representing a set of instructions that when executed by a computer causes the computer to:
 - generate and cause application of a non-selective preparation segment in a first acquisition period of a series of acquisition periods;
 - generate and cause application of a notched preparation segment in subsequent acquisition periods;
 - generate and cause application of an image acquisition segment in at least the subsequent acquisition periods;
 - and
 - acquire MR data in the subsequent acquisition periods.
- [c24] 24. The computer readable storage medium of claim 23 wherein the set of instructions further causes the computer to assess a linearity of contrast concentration in a region-of-interest.
- [c25] 25. The computer readable storage medium of claim 23 wherein the series of acquisition periods extends over at least two R-R intervals.

- [c26] 26. The computer readable storage medium of claim 23 wherein the image acquisition segment of the first acquisition period has a spatial resolution that is one-half of that for each other acquisition segment.
- [c27] 27. The computer readable storage medium of claim 23 wherein the set of instructions further causes the computer to cause application of the non-selective preparation segment to be effective for a first slice and a next slice.
- [c28] 28. The computer readable storage medium of claim 27 wherein the set of instructions causes the computer to acquire MR data for a single slice in each acquisition period.
- [c29] 29. The computer readable storage medium of claim 27 wherein the non-selective preparation segment includes a saturation recovery RF preparation pulse.
- [c30] 30. A computer data signal embodied in a carrier wave and downloadable/uploadable to an MR imaging system, the signal representing at least a pulse sequence to be carried out for MR data acquisition by the MR imaging system, the pulse sequence having:
 - a non-selective preparation pulse to be played out during a calibration interval;

a notched preparation pulse to be played out in a series of data acquisition intervals following the calibration interval; and

a series of imaging pulses to be played out in the calibration and data acquisition intervals for data acquisition in the calibration and data acquisition intervals.